IN THE CLAIMS

1   1. (Original) In an intermediate network device having a plurality of ports for

2 forwarding messages in a computer network and two or more supervisors, each supervi-

3 sor including at least one spanning tree protocol (STP) engine configured to transition the

4 ports of the device among a plurality of spanning tree port states, a method for continuing

5 operation of a spanning tree protocol despite crashes or failures, the method comprising

6 the steps of:

7   designating a first supervisor to be an active supervisor and a second supervisor to

8 be a standby supervisor for the network device;

9   running the spanning tree protocol at the active supervisor such that the STP en-

10 gine at the active supervisor elects at least one root of the computer network and directs

11 the ports to transition among the spanning tree port states;

12   storing the spanning tree port states of the ports at the standby supervisor;

13   in response to a failure at the active supervisor, running the spanning tree protocol

14 at the standby supervisor; and

15   utilizing the stored spanning tree port states of the ports at the standby supervisor

16 to run the spanning tree protocol at the standby supervisor.

1   2. (Original) The method of claim 1 further comprising the step of informing the

2 standby supervisor whenever a port is transitioned from a first spanning tree port state to

3 a second spanning tree port state by the active supervisor.

1   3. (Original) The method of claim 1 further comprising the steps of:

2   storing the spanning tree port states at the ports;

3   executing a consistency check between the spanning tree port state information at

4 the newly active supervisor and the spanning tree port state information at the ports.

1   4. (Original) The method of claim 3 further comprising the steps of:

2   leaving all ports that pass the consistency check in their current spanning tree port

3   state; and

4   transitioning all ports that fail the consistency check to a non-forwarding spanning

5   tree port state.

1   5. (Previously presented) The method of claim 4 further comprising the step of, in

2   response to the failure at the active supervisor, designating the standby supervisor to be a

3   newly active supervisor for the network device.

1   6. (Original) The method of claim 1 further comprising the step of identifying the

2   at least one root of the computer network by the standby supervisor following the failure

3   of the active supervisor.

1   7. (Original) The method of claim 6 further comprising the step of, if the network

2   device is not the at least one root, generating and forwarding one or more topology

3   change notification protocol data unit (TCN-PDU) messages.

1   8. (Previously presented) The method of claim 2 wherein the step of informing

2   comprises the steps of:

3   generating, at the active supervisor, a port change state event in response to de-

4   termining that a given port is to transition from a first spanning tree port state to a second

5   spanning tree port state;

6   associating the port change state event with a corresponding sequence number;

7   notifying the given port of the corresponding sequence number when the active

8   supervisor directs the given port to change spanning tree port states; and

9   storing, at the given port, the sequence number.

1   9. (Previously presented) The method of claim 8 further comprising the steps of:

2   notifying the standby supervisor of the port change state event and the sequence

3   number; and

4   storing, at the standby supervisor, the second spanning tree port state for the given

5   port and the corresponding sequence number.

1   10. (Original) The method of claim 9 wherein the step of executing the consis-

2   tency check comprises the step of comparing the one or more sequence numbers stored

3   by the ports with the sequence number stored by the standby supervisor.

1   11. (Original) The method of claim 9 further comprising the steps of:

2   clearing each port change state event upon directing the given port to change

3   spanning tree port states;

4   in response to the failure at the active supervisor, designating any port change

5   state events not cleared by the failed active supervisor as open events; and

6   for each open event:

7   storing, at the standby supervisor, the second spanning tree port state for

8   the given port; and

9   directing the given port to change spanning tree port states as specified in

10   the open event.

1   12. (Original) The method of claim 1 wherein, in response to the failure at the ac-

2   tive supervisor, the standby supervisor elects the at least one root and directs the ports to

3   transition among the spanning tree port states.

1   13. (Original) The method of claim 12 wherein the step of running the spanning

2   tree protocol at the standby supervisor comprises the steps of:

4

3   generating a plurality of configuration bridge protocol data unit (BPDU) mes-

4   sages; and

5   forwarding the BPDU messages from the ports of the network device,

6   wherein the BPDU messages include a Topology Change (TC) flag field, and the TC flag

7   field is asserted.

1   14. (Original) The method of claim 4 wherein the non-forwarding spanning tree

2   port state of the transitioning step is one of blocking and listening spanning tree port

3   states.

1   15. (Original) The method of claim 4 wherein the steps of executing and identi-

2   fying are each performed by the standby supervisor.

1   16. (Original) The method of claim 1 free from informing the standby supervisor

2   of the at least one root elected by the active supervisor.

1   17. (Original) An intermediate network device for use in a computer network, the

2   intermediate network device comprising:

3   a plurality of ports for forwarding messages;

4   a first supervisor having at least one spanning tree protocol (STP) engine config-

5   ured to transition the ports of the device among a plurality of spanning tree port states;

6   a second supervisor having at least one STP engine configured to transition the

7   ports of the device among a plurality of spanning tree port states;

8   means for designating the first supervisor to be an active supervisor and the sec-

9   ond supervisor to be a standby supervisor such that the STP engine at the active supervi-

10   sor elects at least one root of the computer network and directs the ports to transition

11   among the spanning tree port states; and

12   means for storing the spanning tree port states of the ports at the standby supervi-

13   sor.

1   18. (Original) The intermediate network device of claim 17 further comprising

2   means for informing the standby supervisor whenever a port is transitioned from a first

3   spanning tree port state to a second spanning tree port state by the active supervisor

1   19. (Original) The intermediate network device of claim 17 further comprising:

2   means, disposed at the standby supervisor, for detecting a crash or failure at the

3   active supervisor; and

4   means, responsive to a crash or failure at the active supervisor, for running the

5   spanning tree protocol at the standby supervisor utilizing the spanning tree port states

6   stored at the standby supervisor.

1   20. (Original) The intermediate network device of claim 19 further comprising

2   means, responsive to a crash or failure at the active supervisor, for designating the

3   standby supervisor to be a newly active supervisor, whereby, in response to the crash or

4   failure at the active supervisor, the newly active supervisor elects the at least one root and

5   directs the ports to transition among the spanning tree port states.

1   21. (Original) The intermediate network device of claim 18 wherein the informing

2   means comprises:

3   a first event manager disposed at the active supervisor, the first event manager

4   configured to generate port change events in response to the ports transitioning from a

5   current spanning tree port state to a new spanning tree port state;

6   a second event manager disposed at the standby supervisor; and

7 means for passing the port change events from the first event manager to the sec-

8 ond event manager.

1 22. (Original) The intermediate network device of claim 21 wherein each port

2 change event generated by the active event manager identifies the respective port and the

3 new spanning tree port state.

1 23. (Original) The intermediate network device of claim 17 whereby the active

2 supervisor does not inform the standby supervisor of the at least one elected root within

3 the computer network.

1 24. (Original) A computer readable medium containing executable program in-

2 structions for continuing operation of a spanning tree protocol (STP) despite crashes or

3 failures at an intermediate network device having a plurality of ports for forwarding mes-

4 sages in a computer network and two or more supervisors, each supervisor including at

5 least one STP engine configured to transition the ports of the device among a plurality of

6 spanning tree port states, the executable program instructions comprising program in-

7 structions for:

8   designating a first supervisor to be an active supervisor and a second supervisor to

9 be a standby supervisor for the device;

10   running the spanning tree protocol at the active supervisor such that the STP en-

11 gine at the active supervisor elects at least one root of the computer network and directs

12 the ports to transition among the spanning tree port states;

13   informing the standby supervisor whenever a port is transitioned to a new span-

14 ning tree port state by the active supervisor;

15   in response to a crash or failure at the active supervisor, designating the standby

16 supervisor to be a newly active supervisor for the network device;

17   executing a consistency check between port state information at the newly active

18 supervisor and port state information at the ports;

19   leaving all ports that pass the consistency check in their current spanning tree port

20 state;

21   transitioning all ports that fail the consistency check to a non-forwarding spanning

22 tree port state; and

23   identifying the at least one root of the computer network.

1   25. (Original) The computer readable medium of claim 24 wherein the program-

2 ming steps for informing comprises the programming steps for:

3   generating, at the active supervisor, a port change event in response to a given

4 port transitioning from a first spanning tree port state to a second spanning tree port state;

5   associating the port change event with a corresponding sequence number;

6   notifying the given port of the corresponding sequence number when the active

7 supervisor directs the given port to change spanning tree port states; and

8   storing, for the given port, the corresponding sequence number.

1   26. (Original) An intermediate network device for use in a computer network, the

2 intermediate network device comprising:

3   a plurality of ports for forwarding messages;

4   a first supervisor having at least one spanning tree protocol (STP) engine config-

5 ured to transition the ports of the device among a plurality of spanning tree port states;

6   a second supervisor having at least one STP engine configured to transition the

7 ports of the device among a plurality of spanning tree port states;

8

8   an elector at the first and second supervisors, the electors configured to cooperate

9   so as to designate the first supervisor to be an active supervisor and the second supervisor

10   to be a standby supervisor, and to activate the STP engine at the active supervisor so that

11   the STP engine elects at least one root of the computer network and directs the ports to

12   transition among the spanning tree port states; and

13   an event manager at the first and second supervisors, the event manager config-

14   ured to transmit spanning tree port state information from the active supervisor to the

15   standby supervisor; and

16   at least one memory at the standby supervisor configured to store the spanning

17   tree port states received from the active supervisor.

1   27. (Original) The intermediate network device of claim 26 wherein the event

2   manager at the active supervisor is further configured to notify the standby supervisor

3   whenever a port is transitioned from a first spanning tree port state to a second spanning

4   tree port state by the STP engine at the active supervisor.

1   28. (Original) The intermediate network device of claim 26 further comprising a

2   failure detection module disposed at the standby supervisor, the failure detection module

3   configured to detect a crash or failure of the active supervisor, and to activate the STP

4   engine at the standby supervisor, wherein the STP engine at the standby supervisor util-

5   izes the spanning tree port states stored at the standby supervisor to run the spanning tree

6   protocol.

1   29. (Original) The intermediate network device of claim 28 further wherein

2   in response to a detection of a crash or failure at the active supervisor the standby

3   supervisor is designated to be a newly active supervisor, and

4   the STP engine at newly active supervisor elects the at least one root and directs

5   the ports to transition among the spanning tree port states.

Please add the following claim 30 et seq.:

1   30. (New) A method for operating a network device comprising:

2   designating a first supervisor to be an active supervisor and a second supervisor to

3   be a standby supervisor for the network device;

4   running a spanning tree protocol (STP) at the active supervisor such that the ac-

5   tive supervisor elects at least one root of the computer network and transitions ports of

6   the network device among a plurality of spanning tree port states; and

7   in response to a failure at the active supervisor, running the spanning tree protocol

8   at the standby supervisor utilizing the spanning tree port states of the ports.

1   31. (New) The method of claim 30 further comprising the step of:

2   informing the standby supervisor whenever a port is transitioned from a first

3   spanning tree port state to a second spanning tree port state by the active supervisor.

1   32. (New) The method of claim 30 further comprising the steps of:

2   storing the spanning tree port states at the ports;

3   executing a consistency check between the spanning tree port state information at

4   the newly active supervisor and the spanning tree port state information at the ports.

1   33. (New) The method of claim 32 further comprising the steps of:

2   leaving all ports that pass the consistency check in their current spanning tree port

3   state; and

4   transitioning all ports that fail the consistency check to a non-forwarding spanning

5   tree port state.

1   34. (New) The method of claim 33 further comprising the step of:

2   in response to the failure at the active supervisor, designating the standby supervi-

3 sor to be a newly active supervisor for the network device.

1   35. (New) The method of claim 30 further comprising the step of:

2   identifying the at least one root of the computer network by the standby supervi-

3 sor following the failure of the active supervisor.

1   36. (New) An apparatus comprising for use in a computer network, the apparatus

2 comprising:

3   means for designating a first supervisor to be an active supervisor and a second

4 supervisor to be a standby supervisor for the network device;

5   means for running a spanning tree protocol (STP) at the active supervisor such

6 that the active supervisor elects at least one root of the computer network and transitions

7 ports of the network device among a plurality of spanning tree port states; and

8   means for running the spanning tree protocol at the standby supervisor utilizing

9 the spanning tree port states of the ports in response to a failure at the active supervisor.

1   37. (New) A computer readable medium containing computer executable instruc-

2 tions for:

3   designating a first supervisor to be an active supervisor and a second supervisor to

4 be a standby supervisor for a network device;

5   running a spanning tree protocol (STP) at the active supervisor such that the ac-

6 tive supervisor elects at least one root of the computer network and transitions ports of

7 the network device among a plurality of spanning tree port states; and

8   in response to a failure at the active supervisor, running the spanning tree protocol

9 at the standby supervisor utilizing the spanning tree port states of the ports.

38. (New) Electromagnetic signals propagating on a computer network comprising:

instructions for execution on a processor for the practice of the method of claim 30.

39. (New) A network device comprising:

a plurality of ports for forwarding messages;

a first supervisor configured to run a spanning tree protocol (STP) such that the first supervisor elects at least one root of the computer network and transitions ports of the network device among a plurality of spanning tree port states;

a second supervisor configured to, in response to a failure, run the STP utilizing the spanning tree port states; and

an elector at the first and second supervisors, the electors configured to designate the first supervisor to be an active supervisor and the second supervisor to be a standby supervisor for the network device.

40. (New) The network device of claim 39 further comprising:

an event manager at the first and second supervisors, the event manager configured to transmit spanning tree port state information from the active supervisor to the standby supervisor; and

at least one memory at the standby supervisor configured to store the spanning tree port states received from the active supervisor.

41. (New) The network device of claim 39 wherein the event manager at the active supervisor is further configured to notify the standby supervisor whenever a port is transitioned from a first spanning tree port state to a second spanning tree port state by the STP engine at the active supervisor.

1   42. (New) The network device of claim 39 further comprising a failure detection

2   module disposed at the standby supervisor, the failure detection module configured to

3   detect a crash or failure of the active supervisor, and to activate the standby supervisor,

4   wherein the standby supervisor utilizes the spanning tree port states stored at the standby

5   supervisor to run the spanning tree protocol.

1   43. (New) The network device of claim 42 further wherein

2   in response to a detection of a crash or failure at the active supervisor the standby

3   supervisor is designated to be a newly active supervisor, and

4   the newly active supervisor elects the at least one root and directs the ports to

5   transition among the spanning tree port states.